

**Amendment and Response**

Applicant: Jeffrey Allen Neilsen et al.

Serial No.: 10/603,896

Filed: June 24, 2003

Docket No.: 100201650-1

**Title: METHODS AND SYSTEMS FOR PRODUCING IMPROVED COLORING  
IN AN OBJECT PRODUCED THROUGH SOLID FREEFORM FABRICATION**

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**REMARKS**

The following remarks are made in response to the Office Action mailed Oct. 12, 2005, in which claims 1-19 were rejected. With this Response, claim 1 has been amended. Claims 1-19 remain pending in the application, with claims 20-47 having been previously withdrawn from consideration as being drawn to a non-elected invention.

**Objection to the Specification**

The Office Action finds that the title of the invention is not descriptive, and requires a new title that is clearly indicative of the invention to which the claims are directed. The Office Action suggests the title "METHOD OF IMPROVING COLOR QUALITY IN AN OBJECT PRODUCED BY SOLID FREEFORM FABRICATION."

With this Response, the title of the application has been amended as suggested in the Office Action. Accordingly, withdrawal of the objection to the specification is requested.

**Claim Rejections under 35 U.S.C. § 102**

Claims 1-3 and 9-19 stand rejected under 35 U.S.C. §102(b) as being anticipated by Shields et al. (U.S. Patent No. 5,181,045).

The Office Action alleges that Shields et al. teaches a process including the steps of ejecting a first material containing a colorant, and causing a reaction that keeps the colorant near a surface of the formed object (by "crashing" or precipitating the colorant out of the material). The Office Action notes that "the aspect of solid freeform fabrication in the preamble of claim 1 is not considered to be a claim limitation and is of no significance in claim construction because the body of claim 1 fully and intrinsically sets forth all of the limitations of the claimed invention."

Under 35 U.S.C. §102, the cited reference must show each and every feature of the claimed invention. Extension of or speculation as to the cited teaching is permitted only when *necessarily present* in the disclosed apparatus or method. In other words, if a particular feature is not specifically disclosed it can only be relied upon under 35 U.S.C. §102 if and only if such feature is necessarily present in the disclosed apparatus or method. See, *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053

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(Fed. Cir. 1987)(“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference”), and *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989) (“The identical invention must be shown in as complete detail as is contained in the ... claim”).

Claim 1 has been amended and now claims a method of improving color quality in an object created by a solid freeform fabrication system that uses a fluid ejection process to build successive layers of the object being fabricated, the method comprising: ejecting a first material to form a layer of a three-dimensional object, the first material containing a colorant; and causing a reaction that keeps the colorant near a surface of the object.

Applicants respectfully submit that Shields et al. fails to show each and every feature of amended claim 1. In particular, Applicants submit that Shields et al. makes no teaching or suggestion regarding *at least ejecting a first material to form a layer of a three-dimensional object, the first material containing a colorant*, and such feature is not *necessarily present* in the disclosed apparatus. Shields et al. teaches pH-sensitive ink compositions with improved ability to resist mixing of one color with another color when both colors are printed in close succession. (See col. 2, lines 57-59, and col. 1, lines 47-57). However, Shields et al. makes no teaching or suggestion regarding **ejecting a first material to form a layer of a three-dimensional object, the first material containing a colorant**, as set forth in amended claim 1. There certainly is no teaching or suggestion in Shields et al. that the noted claim element is *necessarily present*. For at least these reasons, Applicants respectfully submit that Shields et al. fails to teach or suggest each and every feature of the invention as set forth in amended independent claim 1. Accordingly, withdrawal of the rejection of claim 1 under 35 U.S.C. §102(b) is respectfully requested.

Claims 2-3 and 9-19 each depend, either directly or indirectly, from independent claim 1 which is in allowable condition for at least the reasons set forth above. Accordingly, dependent claims 2-3 and 9-19 are also in allowable condition, and withdrawal of the rejection under 35 U.S.C. §102(b) is respectfully requested.

Claims 1-3 and 9-19 stand rejected under 35 U.S.C. §102(e) as being anticipated by Schmid et al. (U.S. Patent Publication 2004/0147630).

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The Office Action alleges that Schmid et al. teaches a process including the steps of ejecting a first material containing a colorant, and causing a reaction that keeps the colorant near a surface of the formed object (by “crashing” or precipitating the colorant out of the material). The Office Action notes that “the aspect of solid freeform fabrication in the preamble of claim 1 is not considered to be a claim limitation and is of no significance in claim construction because the body of claim 1 fully and intrinsically sets forth all of the limitations of the claimed invention.”

Schmid et al. has a publication date of July 29, 2004 and a filing date of January 28, 2003. Accompanying this Amendment and Response is a Declaration of Prior Invention under 37 C.F.R. 1.131 by joint inventors Jeffrey A. Nielsen, Steven T. Castle and David C. Collins to establish conception of the subject matter of the present patent application prior to the filing date of January 28, 2003 of Schmid et al., coupled with due diligence from prior to the Schmid et al. filing date to the filing date of present patent application (i.e., constructive reduction to practice). Applicant respectfully requests consideration of the Declaration of Prior Invention under 37 C.F.R. 1.131.

In view of the above, Applicant submits that Schmid et al. does not qualify as a reference under 35 U.S.C. 102(e) and, therefore respectfully requests that the rejection of claims 1-3 and 9-19 under 35 U.S.C. 102(e) be withdrawn.

**Claim Rejections under 35 U.S.C. § 103**

Claims 1-19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jang et al. (U.S. Patent No. 6,401,002) in combination with either Shields et al. (U.S. Patent No. 5,181,045), or Schmid et al. (U.S. Patent Publication 2004/0147630).

The Office Action alleges that Jang et al. teaches a solid freeform fabrication process of making an object by ejecting a first material containing a colorant as claimed, except that Jang et al. is acknowledged as failing to explicitly teach causing a reaction that keeps the colorant near the surface of the object. The Office Action alleges that Shields et al. and Schmid et al. teach causing a reaction that keeps the colorant near a surface of the formed object, and that such would have been obvious to one of ordinary skill in the art at the time

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the invention was made in the process of Jang et al. in view of either Shields et al. or Schmid et al principally in order to provide an object having a desired color.

In view of the Declaration of Prior Invention under 37 C.F.R. 1.131, Applicant submits that Schmid et al. does not qualify as a reference under 35 U.S.C. 102(e) and, therefore, also does not qualify as a reference under 35 U.S.C. 103(a). Applicant therefore respectfully requests that the rejection of claims 1-19 under 35 U.S.C. 103(a) as being unpatentable over the combination of Jang et al. and Schmid et al. be withdrawn.

With regard to the rejection of claims 1-19 under 35 U.S.C. 103(a) as being unpatentable over the combination of Jang et al. and Shields et al., the Examiner's rejection is respectfully traversed. Referring to Section 706.02 (j) of the MPEP, to establish a *prima facie* case of obviousness, three basic criteria must be met:

- (1) There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference to combine reference teachings;
- (2) There must be reasonable expectation of success;
- (3) The prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on Appellant's disclosure. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (F.E.D. Cir. 1991).

Applicants respectfully submit that the combination of Jang et al. and Shields et al. cannot support a case of *prima facie* obviousness as to the claims because, among other possible reasons, the references fails to disclose all of the elements of the present invention, there is no motivation to combine the reference teachings, and one skilled in the art would have no reasonable expectation of success when combining the references as suggested in the Office Action.

Jang et al. teaches a freeform fabrication process having several different embodiments. The process includes depositing a solidifiable liquid composition (also referred to in Jang et al. as a "baseline material" and also a "body-building material) such as adhesives, waxes, thermoplastic polymers, etc. that becomes the primary constituent material in the object being formed. In one embodiment, the solidifiable liquid composition contains a

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colorant already mixed in. (Col. 8, lines 45-47). In another embodiment, a selected color ink is mixed with the liquid composition just prior to being deposited. (Col. 8, lines 31-33). In other embodiments, droplets of the baseline material are deposited simultaneously or sequentially with the droplets of a color ink. (Col. 8, lines 33-35).

With respect to the embodiments of Jang et al. in which the droplets of the baseline material are deposited simultaneously or sequentially with the droplets of a color ink, clearly Jang et al. fails to teach at least the claim element “ejecting a first material to form a layer of a three-dimensional object, the first material containing a colorant”, as the baseline material of Jang et al. does not contain a colorant in those embodiments. As discussed above with respect to the rejection under 35 U.S.C. §102(b), Shields et al. fails to remedy this deficiency of Jang et al., as Shields et al. also fails to disclose “ejecting a first material to form a layer of a three-dimensional object, the first material containing a colorant.”

With respect to the embodiments of Jang et al. in which the solidifiable liquid composition contains a colorant already mixed in, or a selected color ink is mixed with the liquid composition just prior to being deposited, the Office Action acknowledges that Jang et al. fails to teach causing a reaction that keeps the colorant near the surface of the object. The Office Action alleges that Shields et al. teaches causing a reaction that keeps the colorant near a surface of the formed object, and that one of ordinary skill in the art would use such a reaction in the process of Jang et al. in order to provide an object having a desired color.

Applicants respectfully disagree with the characterization of Shields et al. as set forth in the Office Action, and submit that Shields et al. in fact fails to remedy the acknowledged deficiencies of Jang et al. As noted above with respect to the rejection under 35 U.S.C. §102(b), Shields et al. teaches pH-sensitive ink compositions with improved ability to resist mixing of one color with another color when both colors are printed in close succession on a print medium such as paper. (See col. 2, lines 57-59). That is, when inks of two different colors are printed next to each other, it is desired that the border between the two colors be clean and free from the invasion of one color into the other. (See col. 1, lines 47-57). Put another way, Shields et al. teaches a method for preventing or reducing mixing of two different ink colors at a common border of the two inks. (See col. 2, line 66 through col. 3, line 1). Preventing mixing of two different ink colors at a common border of the inks is not

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the same as causing a reaction that keeps the colorant near a surface of the object, as set forth in claim 1. Shields et al. is only concerned with the common border shared by two adjacent inks, and makes no teaching regarding keeping colorant of the inks near a surface of the print medium (e.g., paper). Thus, Shields et al. also fails to teach or suggest causing a reaction that keeps the colorant near a surface of the object. Accordingly, Jang et al. and Shields et al., alone or in combination, fail to teach or suggest all the claim limitations of claim 1.

In addition, Applicants respectfully submit that there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify and combine the references as has been suggested in the Office Action. Jang et al. notes that earlier patents “failed to recognize critical differences between traditional 2-D color inkjet printing and 3-D inkjet-based RP processes.” (Col. 6, lines 29-31). Thus, Jang et al. itself teaches one skilled in the art that 2-D printing techniques (as taught in Shields et al., for example) are not necessarily useful or applicable to 3-D rapid prototyping processes. Shields et al. teaches that seemingly similar problems (such as waterfastness and bleed resistance) may not necessarily be overcome with similar solutions, noting, “Having solved one problem does not imply a solution to the other.” (Col. 2, lines 59-61). Thus, one skilled in the art would understand that the Shields et al. method to increase bleed resistance at the border of two inks does not necessarily imply a solution for causing a reaction that keeps a colorant near a surface of a 3-D object. For at least these reasons, one skilled in the art would not combine and modify the references as suggested in the Office Action.

For at least the reasons set forth above, withdrawal of the rejection of claim 1 under 35 U.S.C. §103(a) is respectfully requested.

Claims 2-19 each depend, either directly or indirectly, from independent claim 1 which is in allowable condition for at least the reasons set forth above. Accordingly, dependent claims 2-19 are also in allowable condition, and withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested.

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**CONCLUSION**

In view of the above, Applicant respectfully submits that pending claims 1-19 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 1-19 is respectfully requested.

Any inquiry regarding this Amendment and Response should be directed to either W. Bradley Haymond at Telephone No. (541) 715-0159, Facsimile No. (541) 715-8581 or Matthew B. McNutt at Telephone No. (612) 767-2510, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

**Hewlett-Packard Company**  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, Colorado 80527-2400

Respectfully submitted,

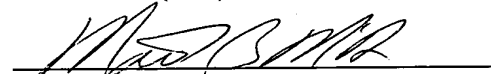
Jeffrey Allen Neilsen et al.

By their attorneys,

DICKE, BILLIG & CZAJA, PLLC  
Fifth Street Towers, Suite 2250  
100 South Fifth Street  
Minneapolis, MN 55402  
Telephone: (612) 573-2000  
Facsimile: (612) 573-2005

Date: January 12, 2006

MBM:dmd:ivh



Matthew B. McNutt

Reg. No. 39,766

**CERTIFICATE UNDER 37 C.F.R. 1.8:** The undersigned hereby certifies that this paper or papers, as described herein, are being deposited in the United States Postal Service, as first class mail, in an envelope address to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 12<sup>th</sup> day of January, 2006.

By 

Name: Matthew B. McNutt